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Subject:	Development of Reference Envelope for the Evaluation of Benthic Risk
Date:	02/25/2009 04:34 PM
Attachments:	PH_Tox_RefStations_090212.xls

Bob, during the sediment conference in Jacksonville, John Toll, Jay Field and I discussed the development of the reference envelope for the evaluation of benthic risk. At that time, we agreed that EPA would develop some additional clarity about what our concerns were given that the LWG was following the procedures outlined in the benthic evaluation framework developed by Don MacDonald and Peter Landrum. I think we have boiled it down to two questions - establishment of the benthic envelope and evaluating sediment toxicity results relative to the reference envelope. I have tried to provide my understanding of these issues below:

1) Establishment of the reference envelope: This step is described in Section 4.4 of MacDonald and Landrum: "While several procedures can be used to calculate the reference envelope, we recommend calculating the lower limit of the reference envelope as the 5th percentile of the control-adjusted response data for each toxicity test and endpoint. It is recommended that the response data be log-transformed prior to calculating the 5th percentile response level. The normal range of reference responses spans the range from the 5th percentile value to the maximum value in the data set." In the attached spreadsheet, a 5th percentile of response level is calculated as 74.5% for the Hyalella biomass endpoint.

Please confirm that this is the general procedure that you will be following recognizing that different software packages will return different values for the 5th percentile.

2) Identifying samples as toxic or non-toxic: This step is also described in Section 4.4 of MacDonald Landrum: "Designate sediment samples with control-adjusted effect values lower than the lower limit of the normal range of control-adjusted responses in reference samples (i.e., lower than the 5th percentile) as toxic for the endpoint under consideration." These procedures our less well defined. MacDonald and Landrum specify a 10% and 20% difference in response rate for establishing low risk and high risk thresholds as stated in Section 4.7:

- These low risk toxicity thresholds were established at COPC/COPC mixture concentrations that corresponded to a 10% increase in the magnitude of toxicity to selected toxicity test organisms, relative to the **average** response rates for toxicity test organisms exposed to reference sediment samples.
- These high risk toxicity thresholds were established at COPC/COPC mixture concentrations that corresponded to a 20% increase in the magnitude of toxicity to selected toxicity test organisms, relative to the average response rates for toxicity test organisms exposed to reference sediment samples.

In the attached spreadsheet, the 10% and 20% difference is calculated as 79.0% and 70.2% respectively. These toxicity thresholds (TT) are applied to samples for which we have chemistry data only (i.e., to predict presence or absence of toxicity for a toxicity test endpoint). However, before a TT is selected, it is evaluated to determine if it can be used to reliably classify samples as toxic or not toxic considering multiple endpoints.

Please confirm that this is the general procedure that you will be following.

We are interested in confirming these procedures consistent with our agreements regarding check-ins on the BERA and to avoid confusion regarding the appropriate procedures to follow.

Thanks, Eric

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